

Customer No.: 31561
Docket No.: 13605-US-PA
Application No.: 10/711,678

In The Claims:

Claim 1 (Previously presented) A patterning method, comprising:
providing a substrate having a film formed over thereon;
forming a photoresist layer over the film;
exposing and developing the photoresist layer to form a patterned photoresist layer; and
etching the film by performing an anisotropic plasma etching process with a power applied at one electrode in a range of about 150W to about 300W for generating a field using the patterned photoresist layer as an etching mask at a temperature range of about -50°C to about 50°C.

Claim 2 (Original) The patterning method of claim 1, wherein the temperature range is between about -30°C and about 30°C.

Claim 3 (Original) The patterning method of claim 1, wherein the temperature range is controlled via a susceptor positioned below the substrate.

Claim 4 (Canceled)

Claim 5 (Previously presented) The patterning method of claim 1, wherein the anisotropic plasma etching process is performed by directing an ionized plasma via the field.

Claim 6 (Original) The patterning method of claim 5, wherein the ionized plasma is formed by ionizing a plasma source comprising at least one inert gas selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr) and xenon (Xe).

Claim 7 (Original) The patterning method of claim 5, wherein a flow rate of the ionized plasma is in a range of about 20sccm to about 200sccm.

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Claim 8 (Original) The patterning method of claim 6, wherein the plasma source further comprises an external plasma source.

Claim 9 (Original) The patterning method of claim 8, wherein the external plasma source comprises $\text{CF}_4:\text{CHF}_3$, $\text{CF}_4:\text{CH}_2\text{F}_2$, $\text{C}_2\text{F}_6:\text{CHF}_3$ or $\text{C}_2\text{F}_6:\text{CH}_2\text{F}_2$.

Claim 10 (Original) The patterning method of claim 9, wherein a gas flow ratio of CF_4 to CHF_3 of the $\text{CF}_4:\text{CHF}_3$, a gas flow ratio of CF_4 to CH_2F_2 of the $\text{CF}_4:\text{CH}_2\text{F}_2$, a gas flow ratio of C_2F_6 to CHF_3 of the $\text{C}_2\text{F}_6:\text{CHF}_3$, or a gas flow ratio of C_2F_6 to CHF_3 of the $\text{C}_2\text{F}_6:\text{CHF}_3$ is larger than 1.

Claim 11 (Previously presented) The patterning method of claim 1, wherein the field comprises an electric field or a magnetic field.

Claim 12 (Canceled)

Claim 13 (Original) The patterning method of claim 1, wherein a thickness of the patterned photoresist layer is in a range of about 200nm to about 500nm.

Claim 14 (Original) The patterning method of claim 1, wherein the photoresist layer comprises a positive photoresist layer or a negative photoresist layer.

Claim 15 (Original) The patterning method of claim 1, wherein the film comprises a single layer or multiple layers.

Claim 16 (Original) The patterning method of claim 1, wherein the film comprises a dielectric layer, an inter-metal dielectric (IMD) layer or an inter-layer dielectric (ILD) layer.

Claim 17 (Original) The patterning method of claim 1, wherein the film comprises an oxide layer, a nitride layer, a poly-silicon layer or a single crystal silicon layer.

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Claim 18 (Original) The patterning method of claim 1, wherein the patterning method is performed to form a trench structure, a contact structure or a via structure in the film.

Claim 19 (Original) The patterning method of claim 17, wherein the trench structure comprises a shallow trench isolation (STI) structure.

Claim 20 (Currently amended) A patterning method, comprising:

providing a substrate having a film formed over thereon;

forming a photoresist layer over the film;

exposing and developing the photoresist layer to form a patterned photoresist layer; and

using the patterned photoresist layer as an etching mask, etching the film by performing an anisotropic plasma etching process with a power applied at one electrode in a range of about 150W to about 300W for generating a field using a plasma sources containing a perfluorinated chemical and a partially fluorinated chemical supplied at a gas flow ratio of larger than 1 at a temperature range of about -50°C to about 50°C .

Claim 21 (previously presented) The patterning method of claim 20, wherein the perfluorinated chemical comprises CF_4 and C_2F_6 , and the p partially fluorinated chemical comprises CHF_3 and CH_2F_2 .

Claim 22 (previously presented) The patterning method of claim 20, wherein the plasma sources further comprises at least one inert gas selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr) and xenon (Xe).